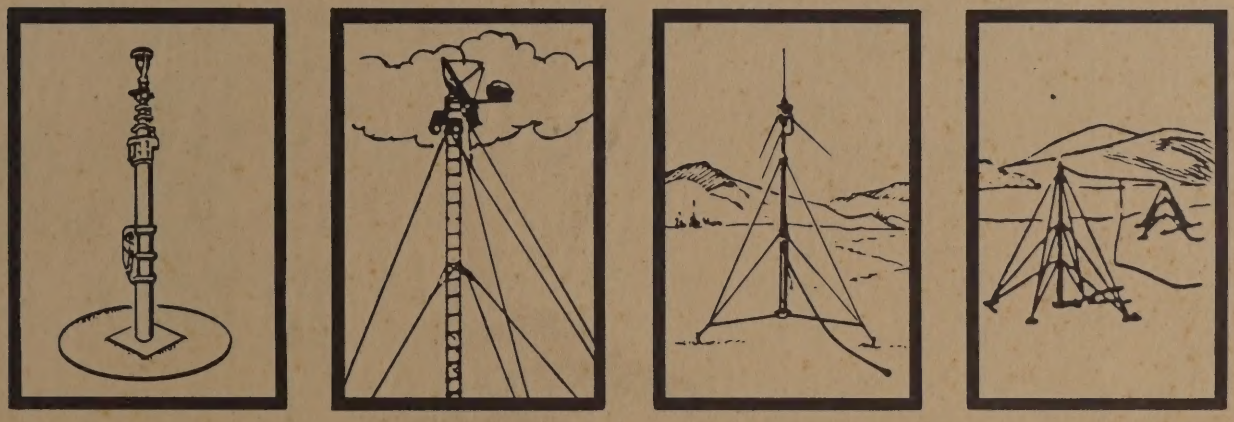
TB 43-0129
TMIN EE 015-AA-SAF-010/E120-SIG 291
TO 31P5-1-1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN
DEPARTMENT OF THE NAVY TECHNICAL BULLETIN
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER



SAFETY MEASURES TO BE OBSERVED WHEN INSTALLING AND USING WHIP ANTENNAS, FIELD-TYPE MASTS, TOWERS, ANTENNAS, AND METAL POLES THAT ARE USED WITH COMMUNICATION, RADAR, AND DIRECTION FINDER EQUIPMENT

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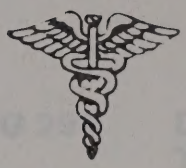
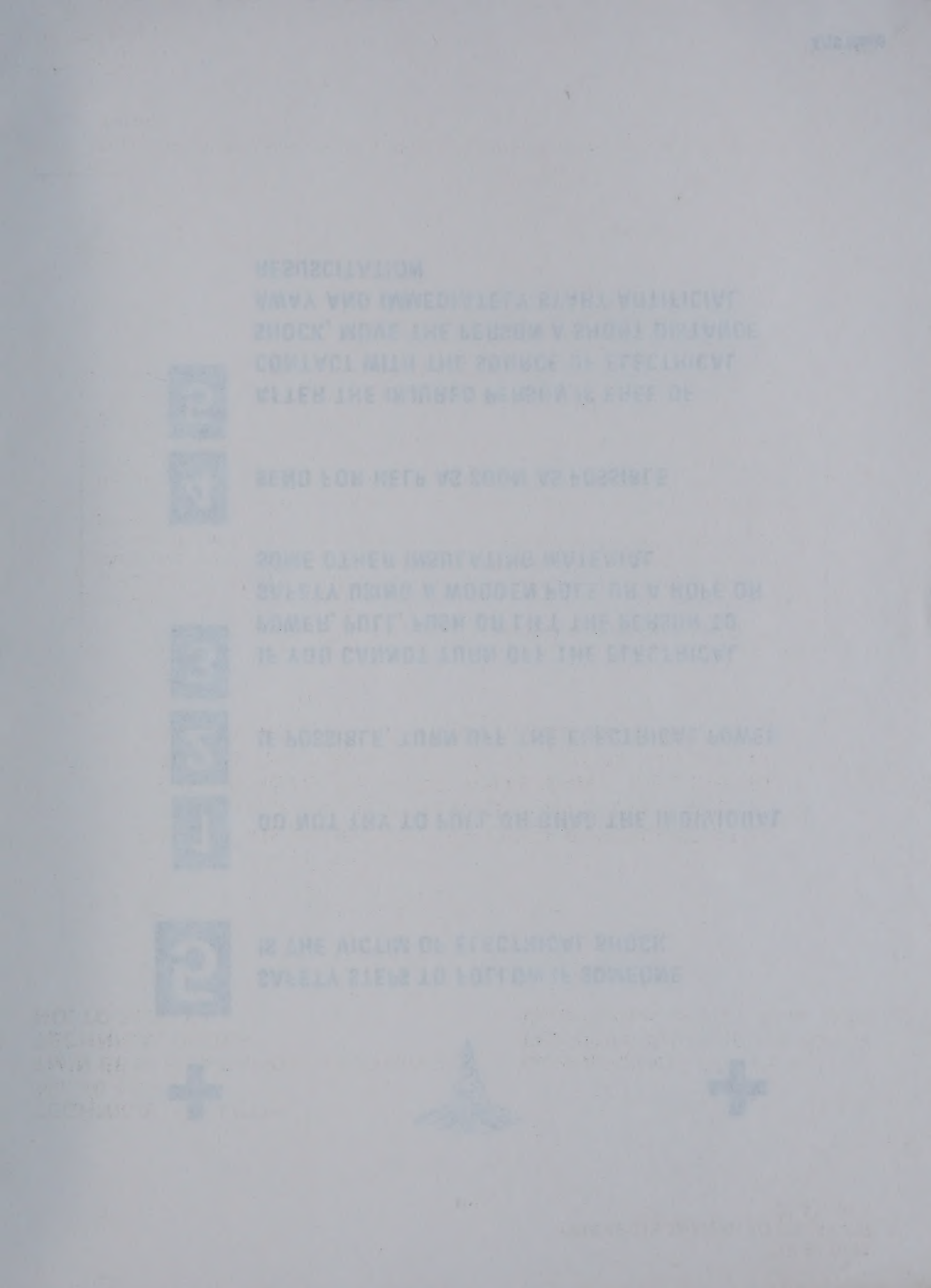
DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE

15 JUNE 1986



5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION



TECHNICAL BULLETIN
No. TB 43-0129
TMIN EE 015-AA-SAF-010/E120-SIG 291
TECHNICAL ORDER
NO. TO 31P5-1-1

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
Washington, DC, 15 June 1986

SAFETY MEASURES TO BE OBSERVED WHEN INSTALLING AND USING WHIP ANTENNAS, FIELD-TYPE MASTS, TOWERS, ANTENNAS, AND METAL POLES THAT ARE USED WITH COMMUNICATION, RADAR, AND DIRECTION FINDER EQUIPMENT

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this technical bulletin. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007.

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward direct to prime ALC/MST.

For Navy, mail comments to the Commander, Naval Electronics Systems Command, ATTN: ELEX 8122, Washington, DC 20360.

In either case, a reply will be furnished direct to you.

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*This technical bulletin supersedes TB SIG 291/TO 31P5-1-1, 7 June 1956, including all changes.

1. GENERAL.

a. During installation and use of vehicular whip antennas, field-type masts, towers, antennas, and metal poles, damage to equipment, serious injury, and death have resulted because personnel have failed to observe safety precautions. The installation or the use of such assemblies is not always limited to placing the equipment in operation, but in some instances the primary purpose is for field demonstrations, training of riggers or linemen, and similar endeavors.

b. Prior to installing or erecting any equipment, survey the area carefully for location of power lines, their height above ground level, and their proximity to the installation being contemplated. In addition, overhead obstructions that may be encountered when mobile operations are contemplated should be considered.

c. When an installation in the vicinity of power lines is planned, the responsible authority will warn all personnel, who are to participate in the exercise, that contact of the structure with high tension power lines in the course of erection can cause, and has caused, instant death. A WARNING to this effect should precede the order to begin erection.

d. The technical manuals, provided for each equipment, should be thoroughly read before attempting any installation or erection. Applicable CAUTION and WARNING notices are placed in these manuals for the protection of personnel and must be observed.

e. The written and pictorial information contained in this bulletin is directly related to *specific* incidents or conditions that have occurred in the field.

2. PURPOSE.

The objective of this bulletin is to acquaint personnel with some of the hazards that have been observed in the field when equipment, of the type described above, are being installed or used. Precautions to be followed in order to prevent serious injury or fatal consequences are outlined below.

3. INSTRUCTIONS.

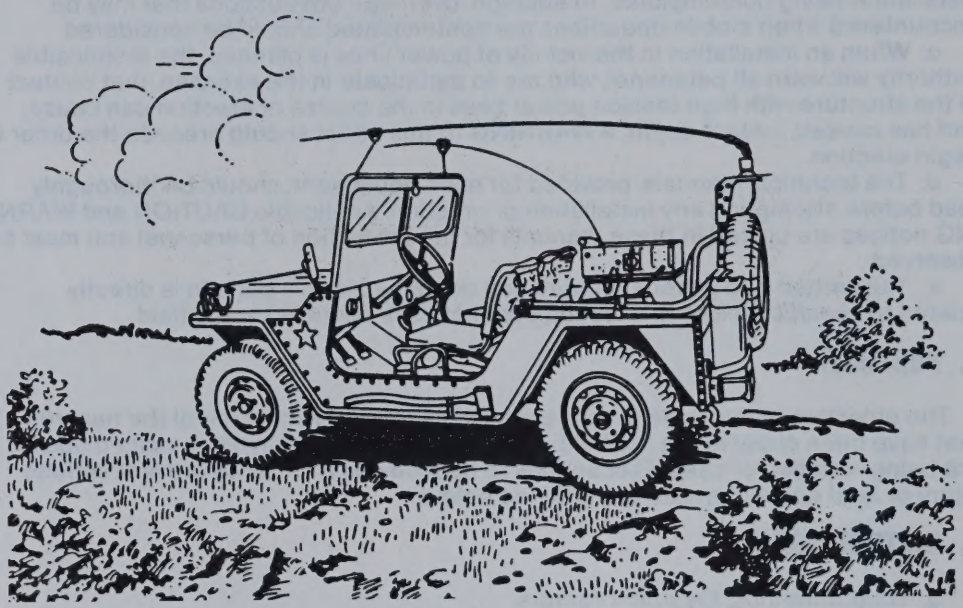
a. Whip Antennas, Electrical Factors.

(1) Never lean against or grasp a whip antenna when the transmitter is operating. Severe burns may result from such action.

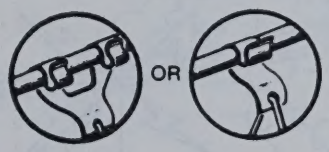
DO NOT STOP YOUR VEHICLE UNDER POWER LINES

(2) When operating with vehicular equipment, never pass under power lines if there is any doubt as to whether there is adequate overhead clearance between the lines and the antenna.
(3) Unless mobile operation is mandatory, always tie the antenna in position so that it will clear all overhead obstructions and power lines. Some antennas, like the AS-1729, are provided with a tie-down assembly. For road

MOBILE OPERATION WITH WHIP ANTENNAS

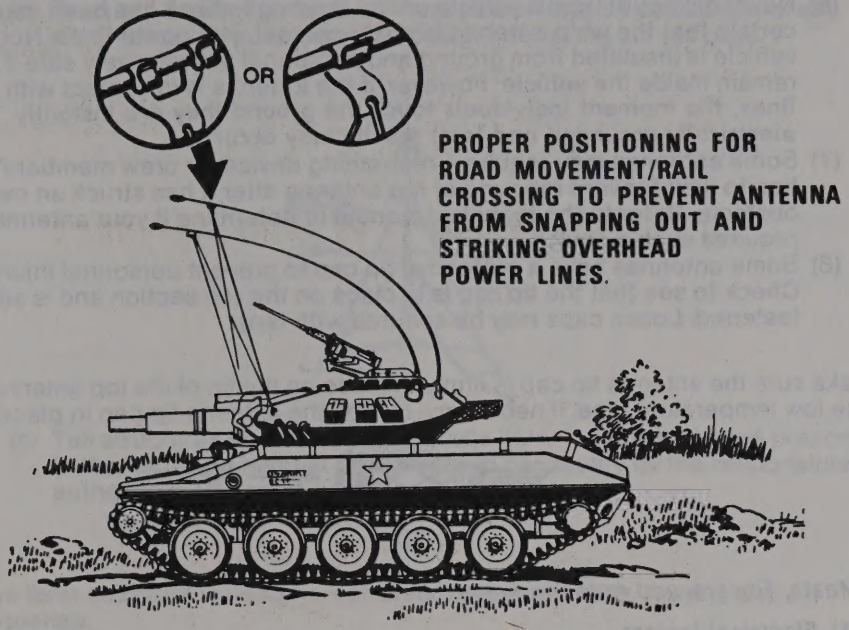


movement/rail crossing, the antenna element must be placed under the tie-down clamp and not into the tie-down clip. This method of tie down should prevent the antenna from dislodging and striking high-tension wires.



PROPER TIE DOWN CLAMP

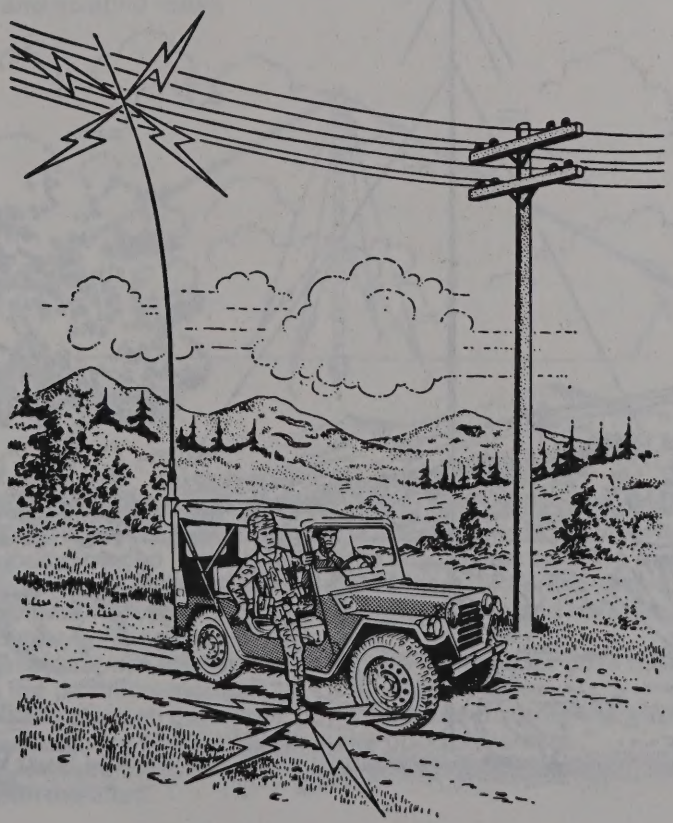
Failure to follow proper tie-down procedures has resulted in death and major equipment damage. Always refer to the technical manual for exact instructions. With the antenna tie-down in the secure position, damage to the whip can occur if the whip contacts any fixed object such as overhead bridges, etc. The possibility of serious or fatal injury exists to outside personnel from flying antenna parts; therefore, tying an antenna down does not eliminate the need to exercise reasonable care.



PROPER POSITIONING FOR ROAD MOVEMENT/RAIL CROSSING TO PREVENT ANTENNA FROM SNAPPING OUT AND STRIKING OVERHEAD POWER LINES.

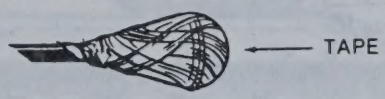
(4) Additional sections will not be attached to whip antennas unless permitted by the appropriate Technical Manual (TM) instructions.

(5) Never permit arms or legs to extend over the sides of the vehicle when engaged in cross-country operations. If the antenna comes in contact with a power line, bodily contact with the ground, wet bushes, trees, or other foliage, will permit the body to act as an electrical conductor and serious shock or death may result.



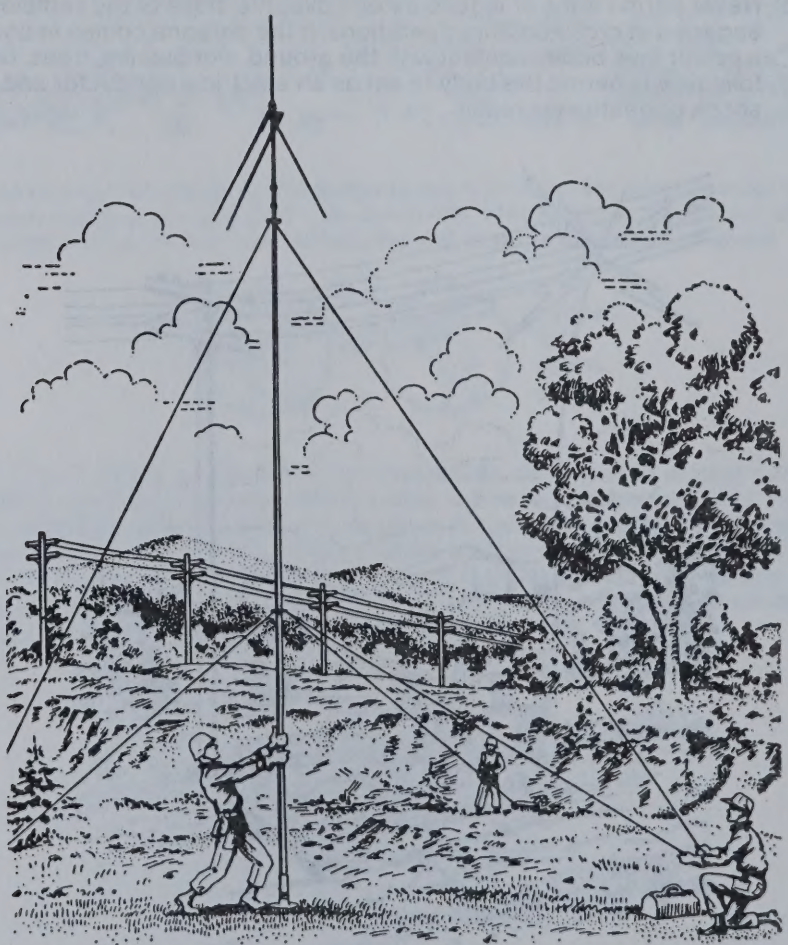
(6) Never dismount from a vehicle until a thorough check has been made to be certain that the whip antenna is not in contact with power lines. Normally a vehicle is insulated from ground and personnel are relatively safe if they remain inside the vehicle; however, if the antenna is in contact with power lines, **the moment individuals touch the ground they are instantly electrically grounded and fatal results may occur.**
(7) Some antennas may require a restraining device for crew members' protection to limit forward rebound of the antenna after it has struck an overhead obstacle. Refer to the technical manual to determine if your antenna requires such a device.
(8) Some antennas have a protective tip cap to prevent personnel injury. Check to see that the tip cap is in place on the top section and is securely fastened. Loose caps may be secured with tape.

Make sure the antenna tip cap is firmly in place on the tip of the top antenna element. Use low temperature tape, if necessary, to tape the antenna tip cap in place.

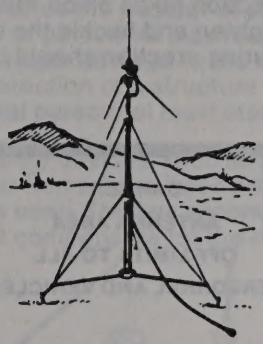


b. Masts, Towers, and Antenna Assemblies.

(1) *Electrical factors.*
(a) Masts, towers, and antennas must be installed as far away from power lines as possible. As a basic guide, a distance equal to at least twice the height of the structure should be maintained.



(b) Guys will be kept as far away from power lines as possible, thereby eliminating the possibility of a power line falling across guys.



(c) Tall structures should have adequate lightning protection as prescribed in the technical manual or as deemed necessary by the responsible authority in charge of erection.

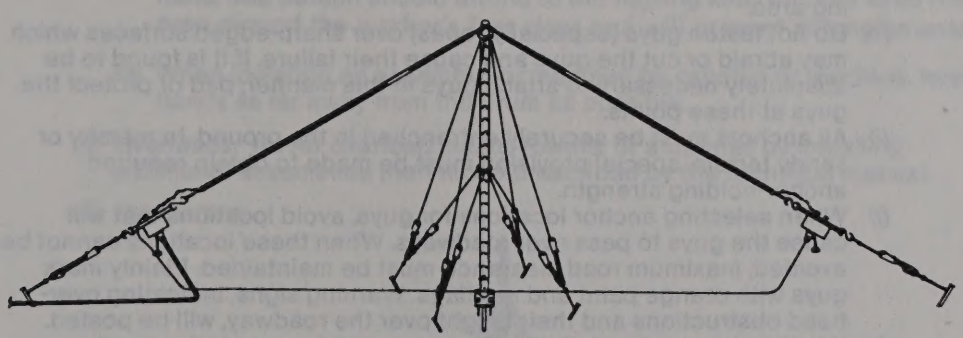
NOTE

The term structure is used hereafter to represent masts, towers, and antennas.

(d) Never touch a structure, or any attachment connected to it, if the possibility exists that it may be accidentally energized electrically. The area around a structure that is suspected of being energized should be roped off and guards should be posted to prevent anyone from entering the area. Immediately thereafter, proper authority should be notified so that remedial action can be taken.

(e) Never engage in work on a structure during an electrical storm or when a storm is imminent.

(2) *Guys and hoisting ropes.*



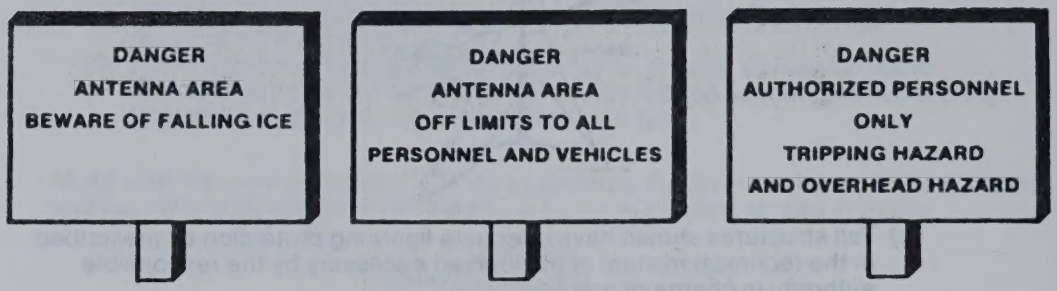
(a) All guys and hoisting ropes (including temporary ones) will be inspected for worn spots, frays, rotten portions, and any other imperfections prior to being placed in use. Do not use any guys or hoisting ropes that show any of these imperfections. Serious injury to personnel and damage to equipment may result if a tower breaks loose and falls because of faulty guys or hoisting ropes.

(b) Never attempt to support a structure using fewer guys than prescribed in the technical manual.

(c) Clearly mark all guy wires, guy ropes, and the antenna wires with a flag or streamers. Strips of cloth make good streamers.

(d) All temporary guys must be left in place until permanent guys have been installed.

(e) When erecting a structure such as an antenna mast, normal procedure requires that the side guys be attached and anchored in position prior to erection. When erection takes place, misalignment of these guys can cause them to overtighten and buckle the structure. Close observation of these side guys during erection should be maintained in order to prevent overtightening.



NOTE

Before leaving your base, make sure you have:

- Enough warning signs.
- Extra streamers or approved markers.
- A supply of special anchors to use in the type of soil you may find in your area of operations.
- Extra guy ropes or approved substitutes.

(f) All guys (especially back guys) must be properly attached and controlled in order to prevent the structure from passing over its upright position (90°). Failute to control the erection in this manner may cause the structure to fall over, on top of the technicians who are pulling it erect.

(g) When hoisting any objects by means of ropes, stand clear of the hoisting area.

(h) Do not fasten guys (especially ropes) over sharp-edged surfaces which may abraid or cut the guys and cause their failure. If it is found to be absolutely necessary to attach guys in this manner, pad or protect the guys at these points.

(i) All anchors must be securely entrenched in the ground. In marshy or sandy terrain, special provision must be made to obtain required anchor-holding strength.

(j) When selecting anchor locations for guys, avoid locations that will cause the guys to pass over roadways. When these locations cannot be avoided, maximum road clearance must be maintained. Plainly mark guys with orange paint and red flags. Warning signs, indicating overhead obstructions and their height over the roadway, will be posted.

(k) If in the course of installation it becomes necessary to suspend operations, sufficient guys must be attached to support the structure safely.

(l) Ropes, davits, and guys used, must be of sufficient strength to provide adequate support for the purpose for which they are being used.

(3) *Planning Operation.*

(a) Plan the installation so that as much of the assembly of the structure as possible is accomplished on the ground.

(b) Where situations make it mandatory to work aloft, thought should be given to the selection of a suitable working location on the structure so that unnecessary climbing or movement can be avoided.

(c) Plan each aerial operation so that unnecessary work aloft is avoided.

(d) Personnel engaged in installation of a structure should be adequately instructed by the responsible authority as to the overall method of erection.

(e) Under no circumstances should the erection of a structure be attempted without the required number of trained personnel. The technical manual specifies the number of personnel required. Use of less than this number of personnel may result in serious injury to participating personnel or major damage to the equipment. Only personnel required for the erection of a structure will be in the erection area. All other nonessential personnel must stand clear of the area.

(f) When specific safety devices, such as safety belts, rubber gloves, safety shoes, and similar items, have been provided for protection of personnel, they must be used. The few seconds saved by not using these devices does not compensate for the hazards involved.

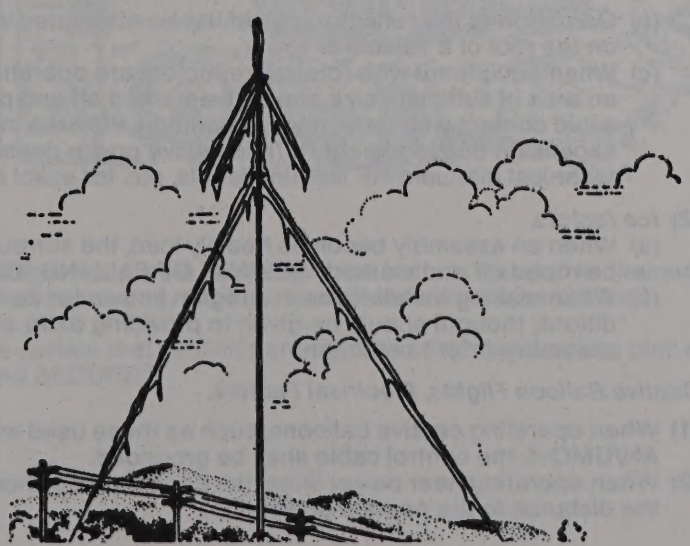
(4) *Working area.*

(a) Never walk directly beneath a structure during erection.
(b) Never stand directly beneath anything being hoisted.
(c) When raising or lowering an assembly, or member, either by winch or hand, one person should attend to the hauling line. This will keep the area around the worker's feet clear and will prevent entanglements.

(d) When lowering an assembly, or member, by capstan or windlass, keep hands as far away from the drum as possible.

(5) *Overloads.* Never overload masts, towers, or antennas by installing additional assemblies than those prescribed by the technical manual.

(6) *Ice factors.*

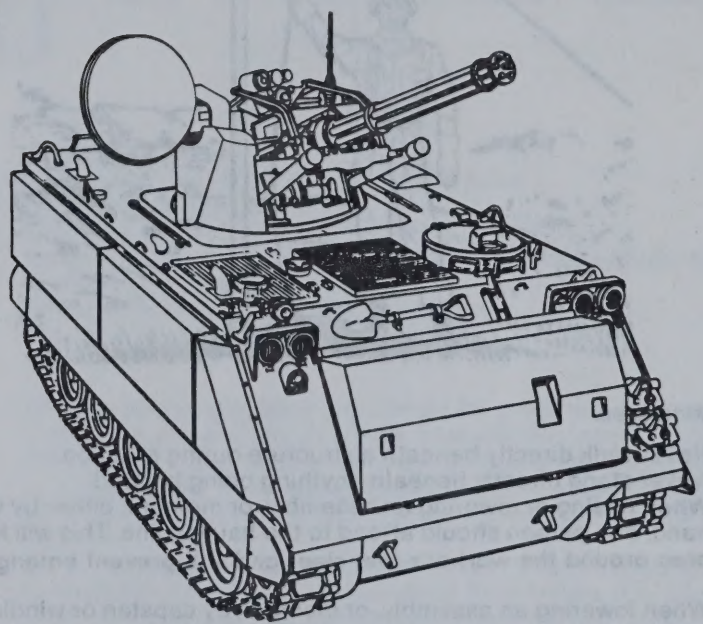


(a) When a structure becomes heavily iced, the surrounding area should be roped off and marked "BEWARE OF FALLING ICE."
(b) When making installations in a region known for its heavy icing conditions, thought should be given to providing extra supporting guys, prior to erection.

c. *Radar Equipments.*

(1) *Reflector clearances.*

(a) Some radar sets are installed in vehicles with a rotating reflector mounted on the roof. Because of the large size of the reflector, caution should be exercised to avoid contact with power lines adjacent to, or crossing, roadways.



(b) Operation of the reflector should not be attempted when personnel are on the roof of a vehicle or tower.
(c) When equipment with rotating reflectors are operating at ground level, an area of sufficient size should be marked off and posted in order to avoid contact with personnel. In addition, the area may require further expansion due to unsafe RF/microwave power density levels. Refer to technical manuals, RF warning labels, etc. for exact instructions.

(2) *Ice factors.*

(a) When an assembly becomes heavily iced, the surrounding area should be roped off and marked "BEWARE OF FALLING ICE."
(b) When making installations in a region known for its heavy icing conditions, thought should be given to providing extra support to the assembly, prior to erection.

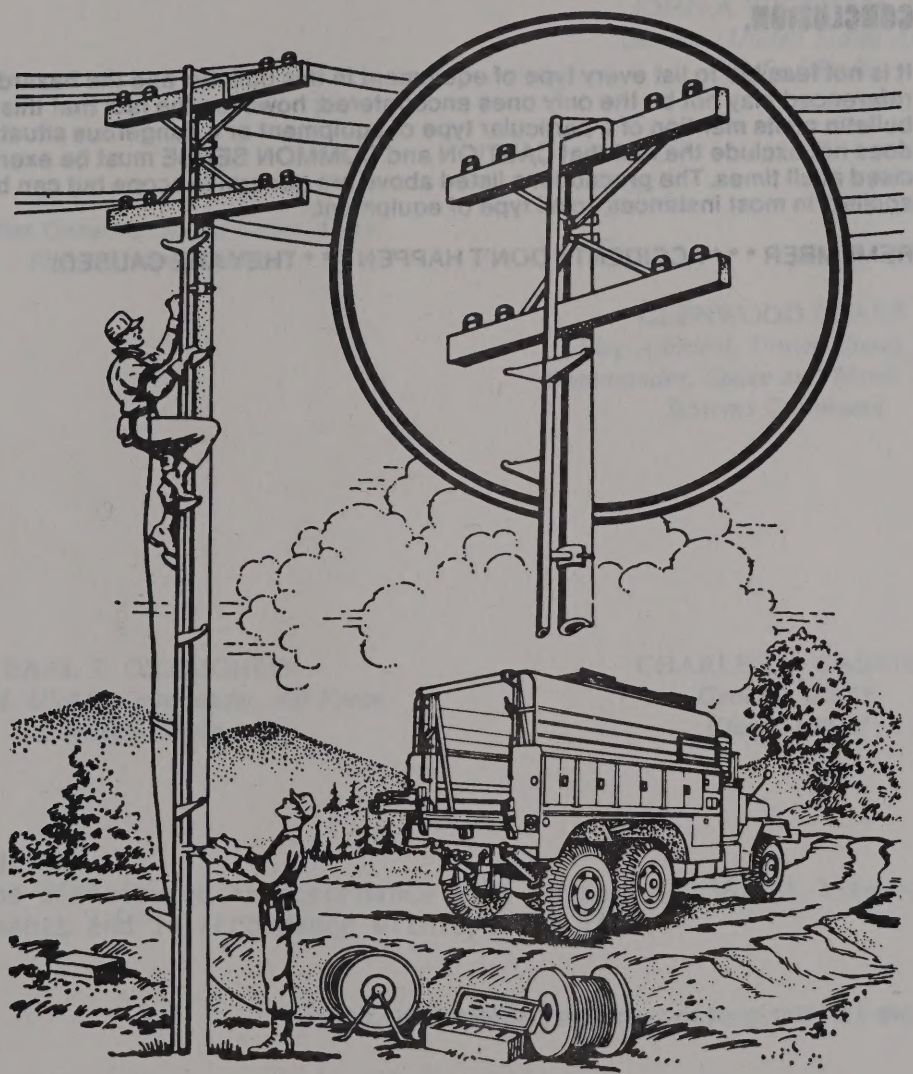
d. *Captive Balloon Flights, Electrical Factors.*

(1) When operating captive balloons, such as those used with Wiresonde AN/UMQ-4, the control cable shall be grounded.
(2) When operating near power lines, the control cable should be shorter than the distance to the nearest power line.

e. Metal Poles, Electrical Factors.

(1) Never erect a metal pole, such as Sectional Metal Poles AB-308/G or AB-309/G in the vicinity of power lines. A minimum distance equal to twice the height of the pole should be maintained between the power lines and the poles.

(2) Always be sure the scaling-ladder hooks are placed over the top crossarm and that they straddle the pole.



(3) Before climbing a metal pole, make sure the bottom standoff is chained securely. When ascending, the top standoff should also be chained securely.

(4) Always make certain that all joints are tight and that the coupling pins are IN PLACE and SECURED.

f. Basic Rescue Rules.

In the event an individual comes in contact with an electrified structure, follow the procedures below in the order that they are listed.

(1) Never attempt to grasp the individual and pull free — such an action can cause instant death to the rescuer.
(2) Try to free the individual by using a wooden pole, rope, or some other insulated object.
(3) Apply artificial respiration immediately upon freeing the individual.
(4) Notify responsible authority for assistance.

4. CONCLUSION.

It is not feasible to list every type of equipment in this bulletin, and the hazards referenced may not be the only ones encountered; however, the fact that this bulletin omits mention of a particular type of equipment or a dangerous situation does not exclude the fact that CAUTION and COMMON SENSE must be exercised at all times. The precautions listed above are general in scope but can be applied, in most instances, to all type of equipment.

REMEMBER * * * ACCIDENTS DON'T HAPPEN * * * THEY ARE CAUSED!

By Order of the Secretaries of the Army, the Navy and the Air Force:

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